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10 CFR 50.4  
10 CFR 50.90

November 9, 1995

Document Control Desk  
U.S. NUCLEAR REGULATORY COMMISSION  
Mail Station P1-137  
Washington, D. C. 20555

Gentlemen:

DOCKETS 50-266 AND 50-301  
EMERGENCY TECHNICAL SPECIFICATIONS CHANGE REQUEST 184  
INCORPORATION OF F\* STEAM GENERATOR TUBE REPAIR CRITERION  
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

In accordance with the requirements of 10 CFR 50.4 and 50.90, Wisconsin Electric Power Company (Licensee) hereby requests amendments to Facility Operating Licenses DPR-24 and DPR-27 for Point Beach Nuclear Plant (PBNP) Units 1 and 2, respectively, to incorporate changes to the plant Technical Specifications. The proposed revisions will modify Technical Specification Section 15.4.2, "Inservice Inspection and Testing of Safety Class Components," to incorporate a new steam generator tube acceptance criterion known as F\* for the PBNP Unit 2 steam generators. This criterion would allow tubes that are degraded or defective in a location not affecting the structural integrity of the tube to remain in service.

Marked-up Technical Specifications pages, a safety evaluation, the no significant hazards consideration, and B&W Nuclear Technologies (BWNT) Document 51-1239602-00, "Point Beach 2 Repair Roll Qualification Report," are enclosed.

Please note that in accordance with 10CFR2.790, B&W Document 51-1239602-00 is considered "BWNT Proprietary." It is, therefore, requested that this information be withheld from public disclosure. An affidavit supporting this classification signed by J. H. Talyor, Manager, Licensing Services, B&W Nuclear Technologies, will be forwarded under separate cover. A non-proprietary version of B&W Document 51-1239602-00 will also be forwarded under separate cover.

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#### DESCRIPTION OF CURRENT LICENSE CONDITION

Technical Specification (TS) Section 15.4.2, Specification A details the requirements for steam generator tube inspections, including sample selection, examination methods, inspection intervals, acceptance limits, corrective measures, and reporting requirements.

#### DESCRIPTION OF PROPOSED CHANGES

The proposed changes will modify TS 15.4.2.A to allow the use of a repair roll (reroll) and the F\* (F-star) acceptance criterion as a repair option. The following changes are proposed:

1. New Specification 15.4.2.A.2(e) is being added to read as follows:

"(e) In addition to the sample size required in Specifications 15.4.2.A.2(a) through (d), all F\* tubes shall be inspected in the F\* region. The results of F\* tube inspections are not to be used as a basis for additional inspections per Table 15.4.2-1.<sup>1</sup>"

2. A footnote is being added to the bottom of page 15.4.2-2 to read as follows:

"<sup>1</sup> This requirement applies only to the Westinghouse Model 44 steam generators in Unit 2. Following steam generator replacement in Unit 2, this requirement is null and void."

3. Existing Specification 15.4.2.A.2(e) is being renumbered to 15.4.2.A.2(f).

4. Specification 15.4.2.A.5(a) is being modified by adding the following definitions:

"F\* Distance is the distance of the expanded portion of a tube which provides a sufficient length of undegraded tube expansion to resist pullout of the tube from the tubesheet. The F\* distance is 0.88 inches (not including eddy current uncertainty).<sup>2</sup>"

"F\* Tube is a tube with degradation, below the F\* distance, equal to or greater than 40%, and not degraded (i.e., no indications of cracking) within the F\* distance.<sup>2</sup>"

5. Specification 15.4.2.A.6, "Corrective Measures," is being modified to read as follows:

"All tubes that leak or have degradation exceeding the plugging limit shall be plugged or repaired by a process such as sleeving<sup>1</sup> or classification as an F\* tube<sup>2</sup> prior to return to power from a refueling or inservice inspection condition. Sleeved tubes having sleeve degradation exceeding 40% of the nominal sleeve wall thickness shall be plugged."

6. A footnote is being added to the bottom of page 15.4.2-4 to read as follows:

"<sup>2</sup> Applicable only to the Westinghouse Model 44 steam generators in Unit 2. Following steam generator replacement in Unit 2, the definitions and F\* repair option are null and void."

7. The mark for the existing footnote regarding sleeving at the bottom of page 15.4.2-4 is being changed from a "\*" to a "1" to avoid confusion with F\*.

#### BASIS AND JUSTIFICATION

Using existing Technical Specification tube plugging criteria, many tubes experiencing only minor degradation in the tubesheet region would have to be removed from service or repaired by sleeving. However, with the analysis described in this submittal and in BWNT Document 51-1239602-00, "Point Beach 2 Repair Roll Qualification Report," it has been determined that tube plugging or sleeving is not required in many cases to maintain tube bundle integrity. This report provides justification for implementation of the reroll repair and F\* criterion in the PBNP, Unit 2 steam generators. The report is based on engineering analysis and qualification testing previously accepted by the NRC for use at Indian Point, Unit 2.

The basis for steam generator tube surveillance and plugging/repair is to ensure that the structural integrity of the tubes is maintained. The F\* criterion was developed to allow an alternative to tube plugging or sleeving for indications that occur in the tubesheet area. The F\* criterion defines a length of undegraded expanded tube in the tubesheet region that is sufficient to maintain the structural integrity of the tube and

limit any potential leakage (resulting from cracks occurring further down in the tubesheet) well below the TS limit and safety analysis assumptions.

The proposed TS changes are requested to provide PBNP an alternative for dispositioning steam generator tubes with eddy current indications in the tubesheet region. This repair option allows such a tube to be rerolled rather than sleeved or plugged. The new hardroll is placed within the tubesheet, in an area free of degradation, above any existing intra-tubesheet indications. The new hardroll has a length greater than or equal to the F\* distance.

The proposed changes are applicable only to the Westinghouse Model 44 steam generators in Unit 2. Following steam generator replacement, scheduled for the Fall of 1996, all references to the F\* criterion are null and void. These references will be removed from the Technical Specifications at a convenient time after the steam generators have been replaced.

PBNP, Unit 2 was shutdown on October 7, 1995, for a scheduled refueling and maintenance outage. Eddy current testing of the steam generator tubes began on October 16, and was completed on October 25. The eddy current inspection program essentially consisted of a bobbin coil inspection with followup of all distorted indications with a Plus Point probe. This was the first time the Plus Point probe was used at PBNP.

While performing a followup inspection with the Plus Point probe, two indications were found in the hot leg tubesheet region of an unsleeved tube that the Bobbin coil did not detect. As a conservative measure, we expanded our inspection scope to include an examination of the tubesheet region of all unsleeved hot leg tubes in both steam generators with the Plus Point probe. These expanded inspections revealed numerous additional axial indications that the Bobbin coil had not detected.

Under existing TS criteria, tubes containing these indications would have to be removed from service by plugging or repaired by sleeving. Plugging all tubes with these indications would significantly reduce reactor coolant system (RCS) flow through the steam generators. Although we have performed analyses that support operation under these conditions, we believe it is more prudent to repair the tubes in order to maintain as much RCS flow through the steam generators as possible. This approach will minimize the loss of margin in the accident analyses due to reduced RCS flow.

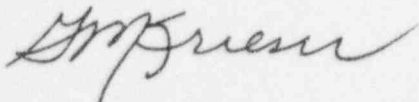
Albeit to a lesser extent, the repair of tubes by sleeving would also reduce RCS flow. The sleeving repair option has several other disadvantages when compared to the rerolling process and application of the F\* criterion. Sleeving would result in more radiation dose to the repair crews and is more costly than rerolling without a corresponding safety benefit. Also, sleeving would take more critical path time to complete and would thus delay the return to service of Unit 2.

The rerolling process and application of the F\* criterion maintains the tubes in service without reducing RCS flow. It is a proven technique that has been accepted by the NRC and implemented at several other utilities. We believe the rerolling process and use of the F\* criterion is the most appropriate choice for repairing the tubes with indications in the tubesheet region from both a nuclear safety and economic perspective. However, the proposed license amendment is required to incorporate the F\* acceptance criterion into the PBNP Technical Specifications for Unit 2. We believe this submittal is timely and could not have been avoided and thus meets the criteria of 10CFR50.91 for processing as an emergency change. As such, we request this change request be processed as an emergency Technical Specifications Change Request and be issued by November 22, 1995.

We have determined that the proposed amendments do not involve a significant hazards consideration, authorize a significant change in the types or total amounts of any effluent release, or result in any significant increase in individual or cumulative occupational exposure. Therefore, we conclude that the proposed amendments meet the requirements of 10 CFR 51.22(c)(9) and that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared.

If you require additional information, please contact us.

Sincerely,



Bob Link  
Vice President  
Nuclear Power

cc: NRC Resident Inspector, NRC Regional Administrator

TECHNICAL SPECIFICATIONS CHANGE REQUEST 184  
SAFETY EVALUATION

INTRODUCTION

Wisconsin Electric Power Company (Licensee) has applied for amendments to Facility Operating Licenses DPR-24 and DPR-27 for Point Beach Nuclear Plant Units 1 and 2. The proposed revisions will modify Technical Specification (TS) Section 15.4.2, "Inservice Inspection and Testing of Safety Class Components," to incorporate a new tube acceptance criterion known as F\*. This criterion would allow tubes that are degraded or defective in a location not affecting the structural integrity of the tube to remain in service.

EVALUATION

The proposed changes address eddy current indications of tube degradation in the tubesheet region. The steam generators at PBNP Unit 2 are Westinghouse Model 44. They were fabricated with a nominal 2.25 inch partial depth roll expansion in the tubesheet. The tubes are installed in the steam generator tubesheet by a hardrolling process that expands the tube to bring the outside surface into intimate contact with the tubesheet bore. The roll process and roll torque are specified to result in a metal-to-metal interference fit between the tube and the tubesheet.

Eddy current testing conducted during the Unit 2, Fall, 1995 refueling and maintenance outage has revealed axial indications in the tubesheet region. Using existing Technical Specification tube plugging criteria, many of the tubes would have to be sleeved or removed from service by plugging. The proposed addition of the F\* distance will provide an acceptance criterion for tubes with indications in the tubesheet region. The F\* distance defines a length of roll expansion for which the structural integrity of the tube is assured during normal operation and postulated accident conditions as required by Regulatory Guide 1.121, "Basis for Plugging Degraded PWR Steam Generator Tubes."

Adoption of the F\* criterion allows a steam generator tube with eddy current indications in the tubesheet region to be rerolled rather than sleeved or plugged. The new hardroll has a length greater than or equal to the F\* distance and is placed within the tubesheet region, in an area free of degradation, above the existing indications. As a result, steam generator tubes with degradation in the tubesheet region below the F\* distance do not require sleeving or plugging.

The F\* distance for Westinghouse Model 44 steam generators was determined by B&W Nuclear Technologies (BWNT) for Indian Point,

Unit 2 and is documented in B&W Report 10195P-01, "W-44 F\* Qualification Report." The NRC approved the Indian Point, Unit 2 license amendment request to incorporate the F\* criterion in a safety evaluation dated March 13, 1995.

An evaluation has been performed by BWNT to provide technical justification for implementing a mid-tubesheet repair roll at PBNP, Unit 2, using the existing F\*/reroll qualification data from Indian Point, Unit 2. The evaluation is documented in B&W Document 51-1239602-00, "Point Beach 2 Repair Roll Qualification Report."

The evaluation examined the difference between the location of the reroll used at Indian Point, Unit 2, and the location of the reroll required for use at PBNP, Unit 2. Based on an assumption in the qualification test program for Indian Point, Unit 2, reroll of the steam generator tube, and hence application of the F\* criterion, was confined to the lower half of the tubesheet. For PBNP, Unit 2, tube reroll and application of the F\* criterion is required in the upper half of the tubesheet.

The evaluation determined that the Indian Point, Unit 2 F\* and reroll qualifications are conservatively applicable to PBNP, Unit 2. The F\* length calculated for PBNP, Unit 2 is 0.88 inches. Including a 0.24 inch allowance for eddy current uncertainty, the total F\* length required for the PBNP, Unit 2 steam generators is 1.12 inches. The F\* length calculated for Indian Point, Unit 2 is 1.01 inches. Including a similar allowance for eddy current uncertainty, the total F\* length for Indian Point, Unit 2 is 1.25 inches.

The PBNP F\* length of 0.88 inches will be reflected in the PBNP Technical Specifications. This F\* length is structurally adequate to satisfy all of the Regulatory Guide 1.121 loading requirements and the PBNP Technical Specification leakage limits. However, as a conservative measure, the actual length of the rerolls installed in the PBNP, Unit 2 steam generators will be greater than or equal to the Indian Point, Unit 2 total F\* length of 1.25 inches.

The evaluation also determined that the new hardroll can be placed at any location within the tubesheet. As a conservative measure, BWNT recommends that the reroll be placed no closer than 2 inches from the top of the tubesheet. The rerolls at PBNP, Unit 2 will be performed in accordance with this recommendation.

To ensure continued integrity of the F\* tubes, a requirement is being added to the PBNP Technical Specifications to inspect the F\* region of all F\* tubes in addition to the initial sample size required by existing specifications. The results of F\* tube inspections will not be used as a basis for additional inspections since 100% of the population is required to be examined during each steam generator eddy current inspection.

## CONCLUSION

The proposed change will provide an additional tube repair option for the last scheduled operating cycle for the existing PBNP, Unit 2 steam generators. A total F\* length of 1.25 inches has been determined for Westinghouse Model 44 steam generators based on engineering analysis and physical testing conducted by BWNT. Use of the F\* acceptance criterion based on this F\* distance was approved by the NRC for use at Indian Point, Unit 2, in a safety evaluation dated March, 13, 1995. Evaluations performed by BWNT have verified that this F\* distance is conservatively applicable to the Westinghouse Model 44 steam generators at PBNP, Unit 2 and that the reroll may be placed at any location within the tubesheet.



TECHNICAL SPECIFICATION CHANGE REQUEST 184  
NO SIGNIFICANT HAZARDS CONSIDERATION

In accordance with the requirements of 10 CFR 50.91(a), Wisconsin Electric Power Company (Licensee) has evaluated the proposed changes against the standards of 10 CFR 50.92 and has determined that the operation of Point Beach Nuclear Plant, Units 1 and 2, in accordance with the proposed amendments does not present a significant hazards consideration. The analysis of the requirements of 10 CFR 50.92 and the basis for this conclusion are as follows:

1. Operation of this facility under the proposed Technical Specifications will not create a significant increase in the probability or consequences of an accident previously evaluated.

The structural integrity and leak limiting capability of the steam generator tubes after rerolling and application of the F\* criterion will be equivalent to that of the original tubes. The F\* criterion has been analyzed and tested for design, operating, and faulted condition loadings in accordance with Regulatory Guide 1.121 safety factors. The potential for tube rupture is not increased by rerolling and application of the F\* criterion. Resistance to tube rupture is strengthened by the presence of the tubesheet. Hardrolling the tube into the tubesheet creates an interference fit between the tube and the tubesheet. Tube rupture cannot occur because the contact between the tube and tubesheet does not permit sufficient movement of tube material. The F\* length of roll expansion is sufficient to preclude tube pullout due to tube degradation located below the F\* distance, regardless of the extent of the tube degradation. Although unlikely, any significant leakage from this region is fully bounded by the existing steam generator tube rupture analysis evaluated in the PBNP Final Safety Analysis Report (FSAR).

In addition, the steam generator tube remains capable of performing its required heat transfer function. Leaving a tube in service with a defect in a portion of the tube that provides no function (below the F\* distance) results in a more efficient steam generator than plugging an affected tube.

Because the structural integrity and heat transfer capability of the steam generator tubes are not significantly altered by the proposed changes, the probability or consequences of an accident previously evaluated are not significantly increased.

2. Operation of this facility under the proposed Technical Specifications change will not create the possibility of a new or different kind of accident from any accident previously evaluated.

Implementation of the F\* acceptance criterion does not introduce any significant changes to the plant design basis. Neither the structural integrity nor the heat transfer capability of the steam generators will be significantly affected by the implementation of the F\* criterion. Any hypothetical accident as a result of tube degradation in the expanded portion of the tube would be bounded by the existing tube rupture accident analysis. Tube bundle integrity is maintained. Tube bundle leak tightness is maintained such that any postulated accident leakage from F\* tubes will be well below existing Technical Specification limits. Other than relocating the tube to tubesheet joint, there is no physical change to the facility, its systems, or its operation. The structural integrity and leak limiting capability of the steam generator tubes after rerolling and application of the F\* criterion will be equivalent to that of the original tubes. Thus, a new or different kind of accident cannot occur.

3. Operation of this facility under the proposed Technical Specifications change will not create a significant reduction in a margin of safety.

The use of the F\* criterion has been demonstrated to maintain the integrity of the tube bundle commensurate with the requirements of Regulatory Guide 1.121 under normal and postulated accident conditions. The F\* distance has been verified by testing to be greater than the length of roll expansion required to preclude both tube pullout and significant leakage during normal and postulated accident conditions.

Implementation of the F\* criterion will decrease the number of tubes which must be removed from service by plugging or repaired by sleeving. Both plugs and sleeves reduce the RCS flow through the steam generators, thereby reducing the RCS flow margin in the accident analyses. Thus, implementation of the F\* criterion will maintain the margin of flow that would otherwise be reduced due to plugging or sleeving.

Based on the above, we conclude that the proposed change does not create a significant reduction in the margin of safety.